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Voice based E-mail system for Visually Challenged People

Prof. Swati B. Raut
Department Of Computer Science & Engineering
J D College of Engineering and Management
(Affiliated to DBATU University)
Nagpur, India

Mr. Piyush Mehta
Department Of Computer Science & Engineering
J D College of Engineering and Management
(Affiliated to DBATU University)
Nagpur, India

Mr. Pranav Jambhulkar
Department Of Computer Science & Engineering
J D College of Engineering and Management
(Affiliated to DBATU University)
Nagpur, India

Mr. Dhananjay Dongare
Department Of Computer Science & Engineering
J D College of Engineering and Management
(Affiliated to DBATU University)
Nagpur, India

Mr. Himanshu Patil
Department Of Computer Science & Engineering
J D College of Engineering and Management
(Affiliated to DBATU University)
Nagpur, India

Abstract— Technology has significantly transformed our daily lives, making it crucial to leverage the internet and its capabilities to the fullest extent. Email is one of the most widely used features on the internet and a fundamental requirement for communication. However, visually impaired individuals face several challenges when using the internet, despite the availability of screen readers. To address this issue, this paper aims to develop a voice-assisted system that will allow visually impaired individuals to access their emails and perform other essential tasks with voice commands. The system will also assist users with daily activities such as using a calculator or playing music. It will use the latest technologies and programming languages to create a user-friendly interface that allows users to navigate different options with voice commands. The system will incorporate speech recognition and text-to-speech technologies to interpret user input and read email messages aloud to the user. In summary, the voice-assisted system will enable visually impaired individuals to access their emails and complete various daily tasks with ease and efficiency, increasing their productivity and independence.

Keywords— *Technology, Internet, Email, visually impaired, challenges, screen readers, voice assistance, daily applications, calculator, audio.*

I. INTRODUCTION

In today's world, the internet has become an indispensable tool for communication, with email being a widely-used method in the business world. However, individuals who are visually impaired or blind often face challenges when it comes to fully utilizing this technology. While there are systems available, such as braille keyboards and screen-readers, they have limitations and drawbacks. Therefore, it has become an ethical responsibility to develop applications that can assist these individuals.

To address this issue, a new voice-based application has been developed that allows visually impaired individuals to send emails without requiring visual objects or mouse clicks. This computer-based system acts as a voice bank, enabling users to record their message, which is then converted to text and sent to the recipient's email address.

This type of system is particularly useful for blind people, as official messages are often sent through email, making it difficult for them to communicate effectively. Additionally, many people prefer to record messages rather than type them due to busy schedules. This application helps to save time and ensures that the message is accurately received.

The user interacts with the system by speaking their message and entering the recipient's email address. The system then converts the voice message to text and sends it to the designated email address. While this voicemail system is not currently available in standard email services such as Gmail, it has the potential to make a significant impact in the lives of visually impaired individuals worldwide.

II. LITERATURE SURVEY

[1] In this system mainly three types of technologies are used namely: STT (Speech-to-text), TTS (text-to-speech), and IVR (Interactive voice response).STT (Speech-to-text),: here whatever we speak is converted to text. There will be a small icon of the mic on whose clicking the user has to speak and his/her speech will be converted to text format, which the blind people would understand.
TTS (text-to-speech), method is the full opposite of STT. This method, which converts the text format of the emails to synthesized speech. IVR (Interactive voice response): IVR allows users to interact with an email host system via a system keyboard, after that users can easily service their own inquiries by listening to the IVR dialogue. IVR systems generally respond with pre-recorded.

[2] This project proposes a Python-based application, designed specifically for visually impaired people. This application provides a voice-based mailing service where they could read and send mail on their own, without any guidance through their G-mail accounts. IVR- Interactive voice response: Interactive voice response (IVR) is a technology that allows a computer to interact with humans through the use of voice and DTMF tones input via a keypad. The VMAIL system can be used by a blind person to access mail easily and adeptly. Hence dependence of the visually challenged on other individuals for their activities associated with mail can be condensed.

[3] This project is a prototype application for a standalone user which works on all the systems having Python 2.7 installed. The application is designed in such a way that it succeeds in implementing the basic features of mail service, based almost entirely on mouse clicks. Python has a design philosophy that emphasizes code readability and a
syntax that allows programmers to express concepts in fewer lines of code than possible in languages such as C++ or Java.

[4] This paper is an attempt to bridge the gap between the Blind populations to access essential electronic communication modes like e-Mail. The system allows a Blind person to send voice-based e-Mails messages. This will reduce the extensive cognitive load taken by a Blind to remember and type characters using a keyboard or a mobile keypad. Further, as messages are sent via voice, it eliminates the lack of English language proficiency of a Blind person.

[5] This application is much more secure and efficient which allows them to access the application by using conversions of Speech-to-Text (STT) and Text-to-Speech (TTS) will help them to listen and respond on their emails. This technique helps them to facilitate the operations of email very easily with the help of Automatic Speech conversion (AVR). This type of application will use SMTP, IMAP, and POP for connection at the server and client end to send and receive the mail.

[6] It provides a voice-based mailing service where they can read and send mail on their own, without any guidance. Here the users have to use certain keywords which will perform certain actions e.g. Read, Send, Compose Mail, Address Book etc. This EMAIL system can be used by a blind person to access mail easily and efficiently.

[7] Speech-to-text conversion in Android: Android provides options to the interfaces the for recognition listener that is used for receiving the speech from the user.Text-to-speech conversion in Android: It is an integral part of the application. It reads the text and converts it into audio and delivered to the user via the microphone of the user.
APIs and keys: The system was implemented in Android. The android provides packages such as recognizer intent and TTS to convert these speeches to text and text to speech.

[8] Speech-to-Text-with-artificial intelligence To turn off the sound and text can be transformed into a light, easy-to-use API for strong, up-to-date, and neural network models. Text-to-speech unification It is an automatic text-to-speech. This technique is very similar to a human verbalizer, to say that it's a text. TTS (text-to-speech) is a technology that enables portable computers to communicate with you. Structure of a text-to-speech unification system
The stages included in producing the synthesis of * the text is perceived to be TTS and reviews to turn the tide, speak with an accent, and create prosody.

[9] Speech-to-text Converter Speech-to-text converter helps to obtain input for the system. When a person speaks through the microphone and is recognized by the system. Speech-to-text Converter Speech-to-text converter helps as to obtain input for the system. When a person speaks through the microphone and is recognized by the system.
IVR (Interactive Voice Response) Interactive Voice Response (IVR) is an advanced technology that shows the interaction between the user and the system which responds by using the keyboard for the respective voice messages.

[10] It is concluded that the system will work well and thus it will fulfill the end users' requirements. This application will be accessed from one or more than one system and hence login from more than one system is tested. It involves the development and implementation of a real-time email interaction system for the visually impaired.

III. Research Methodology

3. Methodology

It is a critical aspect of any research project or study. It outlines the approach and techniques that will be used to achieve the objectives of the research. In this section, we will discuss the methodology used in our project, which is focused on designing a voicemail system that allows users to record and send messages via email.

The primary objective of this project is to develop a user-friendly voicemail system that can be used by people who are visually impaired or find it challenging to type their messages. To achieve this objective, we will employ a mixed-methods research design that combines both qualitative and quantitative research techniques.

In the following subsections, we will discuss the specific research methods that will be used to collect and analyze data, the participants, and sampling technique, the system development approach, and the system requirements and specifications.

3.1 Research Design:

The research design refers to the overall strategy or plan that is used to address the research question. It involves a structured approach to the collection and analysis of data that is aimed at achieving the research objectives. The research design is the blueprint for conducting research, and it helps to ensure that the study is reliable, valid, and generalizable. In this section, we will discuss the research design that was used in the development of the voicemail system.

In the development of the voice mail system, a descriptive research design was used. This research design is used to describe a situation, phenomenon, or event. It involves the collection of data that is used to answer questions about the current state of affairs. The descriptive research design is useful when there is little or no information available on the topic under investigation.

The first step in the research design was to define the research problem. The research problem was identified as the need for a voice mail system that could be used by blind people to send and receive messages. The research question was formulated as follows: How can a voice mail system be developed that is accessible to blind people and converts audio messages to text for delivery via email?

The second step in the research design was to determine the data collection methods. In this study, data was collected through a combination of primary and secondary sources. Primary data was collected through interviews with blind people and experts in the field of accessibility. Secondary data was collected through a review of the literature on the subject. The third step in the research design was to determine the data analysis methods. The data collected was analyzed using content analysis. Content analysis is a research method that involves the systematic categorization and interpretation of data. In this study, the audio recordings of the interviews were transcribed and analyzed using content analysis. The fourth step in the research design was to determine the participants and sampling technique. Participants were selected based on their availability and willingness to participate in the study. A purposive sampling technique was used to select participants who had experience using voicemail systems.

The fifth step in the research design was to determine the system development approach. The system development approach used in this study was the iterative model. The iterative model is a software development process that involves the repetition of a cycle of activities until the desired result is achieved. In this study, the iterative model was used to develop the voice mail system, with each iteration involving the incorporation of feedback from users and experts.

The sixth step in the research design was to determine the system requirements and specifications. The system requirements and specifications were determined based on the needs of blind people and the technical requirements of the system. The system requirements and specifications were used as a basis for the development of the voice mail system.

In conclusion, the research design used in the development of the voice mail system was a descriptive research design. The research design involved defining the research problem, determining the data collection methods and analysis methods, selecting participants, using an iterative model for system development, and determining the system requirements and specifications. The research design helped to ensure that the study was conducted in a systematic and rigorous manner and that the results were reliable, valid, and generalizable.

3.2 Data Collection Methods

Data collection is a crucial aspect of any research project as it provides the necessary information for analysis and drawing conclusions. In this study, data collection will involve the gathering of information on the existing voicemail systems, their limitations, and the requirements for the proposed system. The data collected will be used to design a voicemail system that addresses the identified limitations and meets the specified requirements.

The data collection methods used in this study will include both primary and secondary sources. The primary sources of data will be obtained through interviews, surveys, and observations. The secondary sources of data will be obtained from academic and industry literature, company reports, and other relevant sources.

Observations will be conducted to understand how users interact with the existing systems and identify the limitations of the systems. The observations will be conducted in public places such as libraries, cafes, and airports where users are likely to interact with the

systems. Secondary sources of data will be collected from academic and industry literature, company reports, and other relevant sources. The academic literature will be used to obtain information on the existing voicemail systems, their features, and their limitations. The industry literature will be used to obtain information on the latest developments in voicemail systems and the requirements of users. The company reports will be used to obtain information on the systems used by various organizations and their limitations.

In conclusion, data collection is a critical aspect of this study as it will provide the necessary information for designing a voice mail system that addresses the limitations of the existing systems and meets the specified requirements. The data collection methods used in this study, including interviews, surveys, and observations, will provide a comprehensive understanding of the needs and experiences of users of voicemail systems.

3.3 Data Analysis Methods

Data analysis methods are the techniques that are used to transform and analyze data to derive meaningful insights and conclusions. These methods are used to organize, interpret, and understand the data collected during the research. The goal of data analysis is to identify patterns, relationships, and trends in the data, and to use this information to draw conclusions and make informed decisions. In the context of the voice mail system project, data analysis methods will be used to process the audio data collected from the users and convert it into text data, which can then be further analyzed and processed to send the message to the recipient.
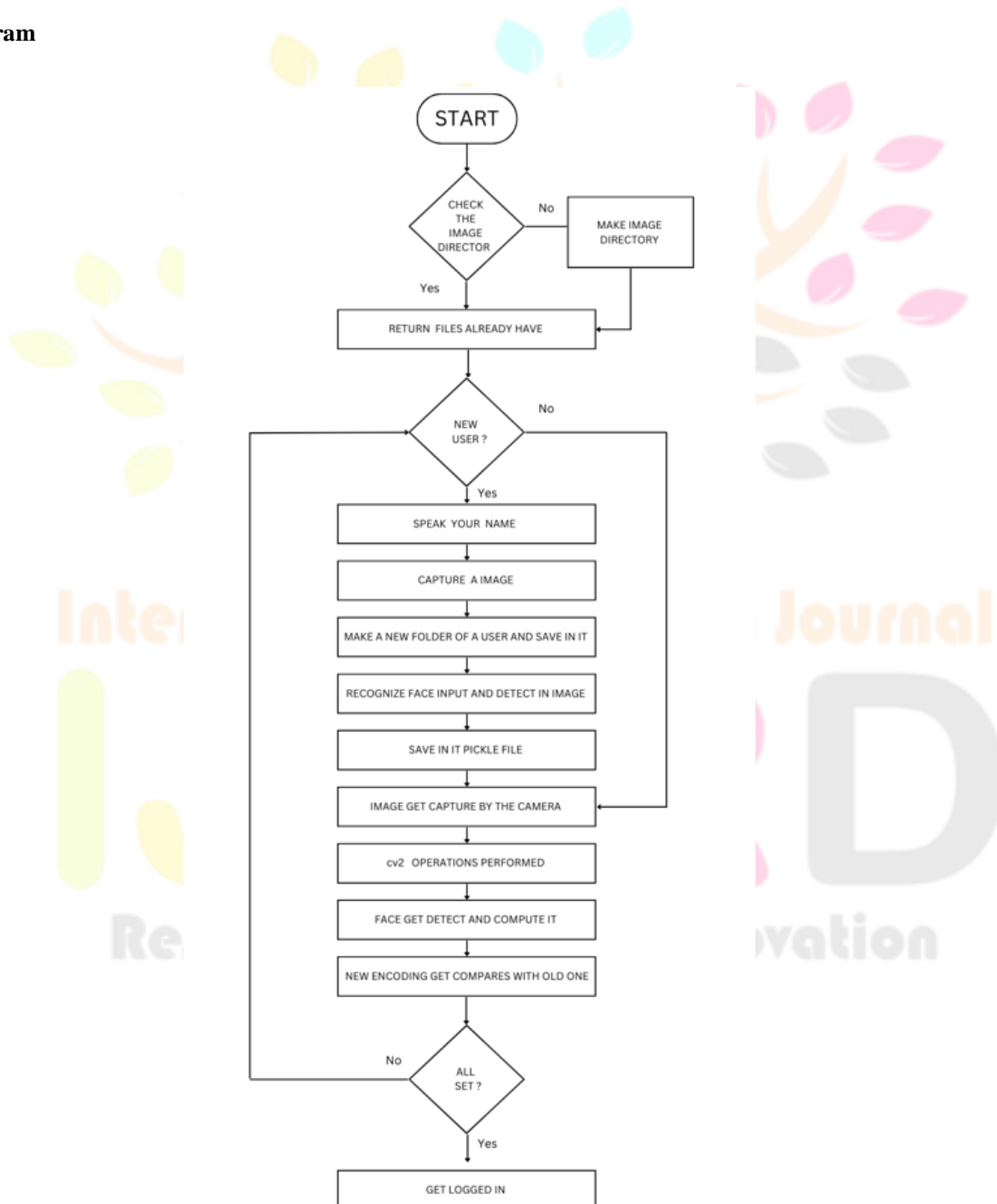
3.4 Block Diagram

Fig 3.1: Face Recognition Module Process Block Diagram

The main objective of our project is to help visually impaired people they can easily read, write or send their emails with the help of their voice. Keeping in mind the security of the user, this email service is available only if the user is registered, so that no third person

can access others' emails. And to do this work our project is mainly divided into three different modules, which will help the user to perform all these operations. Therefore, the three modules that are implemented in this project are-

Face Recognition Module: The face recognition module is mainly implemented for the security purpose of the user. The authentication of the user to login into the system to use the services is mainly done by the facial recognition system. The basic working principle of this module is, the device will capture the face of the user requesting to enter his/her name and store it into the provided location path of the computer. This module has two functionalities, first one is the register button which will be implemented by the new user who is registering into the system for the very first time and the second one is the login button which will be used by the existing user. When someone attempts to enter, the camera will capture the face of that person, perform various cv2 operations and compute the face encodings. If a correct match is found it will log in the user into the system, or otherwise, the person has to register in order to enter into the system to access the email service. Given below is a flowchart to explain the step-by-step working of the module in detail.

The major libraries that will be used in this module are as follows:

1. DLIB - It is used for facial landmark detection.

2. Face Recognition - It allows us to use various important functions for face matching.

3.Open-CV - It is an image-processing library that allows us to perform image and video analysis.

4. OS - It allows us to use various functions to interact with the operating system.

5. The three main processes that are being implemented in the facial recognition module will be-

6. Face Detection- To recognize a face, it is first important that we detect the face first. We extract a human face and then move on to the next step.

7. Feature extraction using face embedding - The next step is to extract features from a face using a face embedding model. A face embedding is a vector that represents the features extracted from the given face and we use these vectors to recognize faces.

8. Face recognition- We have face embedding for each face in the system. After entering a new face to the system, it calculates its face embedding and compares it with the ones that already exist. The face is recognized if its face embedding closely matches any other face embedding in the database.

IV. CONCLUSION

It can be inferred that the system is capable of meeting the end-user's requirements satisfactorily as it has undergone rigorous testing and error rectification procedures. The proposed system aims to develop and implement a real-time email interaction system that caters to the needs of visually impaired individuals. This novel approach eliminates the use of keyboards, thereby reducing cognitive load and enhancing accessibility for users. Our system allows users to interact with the email application through voice commands, thus minimizing the need for manual inputs. Authentication is ensured through voice inputs, making it more user-friendly for handicapped and illiterate people. Our application addresses the limitations of existing email systems, offering a more efficient and accessible solution for visually challenged individuals

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